WHAT IS CLAIMED IS:

1. A single cell, comprising:

(a) a solid electrolyte layer;

(b) an air electrode comprising:

an adhering cathode layer formed on one surface of the solid electrolyte layer and configured to show a function to allow the air electrode and the solid electrolyte layer to adhere electrically and mechanically to each other; and

an electricity collecting cathode layer formed on the adhering cathode layer and configured to show an electricity collecting function of the air electrode ; and

(c) a fuel electrode formed on the other surface of the solid electrolyte layer,

wherein

the adhering cathode layer has a structure denser than the electricity collecting cathode layer, and configures a three-phase interface composed of the solid electrolyte layer, reactive gas and the air electrode or a two-phase interface composed of the solid electrolyte layer and the air electrode, and

the electricity collecting cathode layer is thicker than the adhering cathode layer, and has pores providing the reactive gas to the three-phase interface or the two-phase interface.

2. A single cell, comprising:

(a) a solid electrolyte layer;

(b) an air electrode formed on one surface of the solid electrolyte layer; and

(c) a fuel electrode comprising:

an adhering anode layer formed on the other surface of the solid electrolyte layer and configured to show a function to allow the air electrode and the solid electrolyte layer to adhere electrically and mechanically to each other; and

an electricity collecting anode layer formed on the adhering anode layer

and configured to show an electricity collecting function,

wherein

the adhering anode layer has a structure denser than the electricity collecting anode layer, and configures a three-phase interface composed of the solid electrolyte layer, reactive gas and the fuel electrode, and

the electricity collecting anode layer is thicker than the adhering anode layer, and has pores providing the reactive gas to the three-phase interface.

3. The single cell according to claim 1, wherein

the adhering cathode layer comprises a conductive particle material having a particle diameter of 0.5 μm or less; and

the electricity collecting cathode layer comprises a conductive particle material having a particle diameter of 0.8 μm or more.

4. The single cell according to claim 1, wherein

the adhering cathode layer is a discontinuous thin film layer; and

the electricity collecting cathode layer has conductive particles forming a three-dimensional network structure.

5. The single cell according to claim 1, wherein

a ratio (tc1/tc2) of a thickness (tc1) of the adhering cathode layer to a thickness (tc2) of the electricity collecting cathode layer ranges from 1/1000 to 1/500.

6. The single cell according to claim 1, wherein

the thickness (tc1) of the adhering cathode layer is equal to 1 μm or less, and

the thickness (tc2) of the electricity collecting cathode layer is equal to 10 μm or more.

7. The single cell according to claim 1, wherein

the electricity collecting cathode layer has pores at a rate of 30 to 70 vol% of a total volume.

8. The single cell according to claim 1, wherein

the electricity collecting cathode layer is coated on the adhering cathode layer approximately in a net fashion.

9. The single cell according to claim 1, wherein

the thickness (tc1) of the adhering cathode layer and an average diameter (dc) of constituent particles of the air electrode satisfy a relation of $tc1 \leqq dc$.

10. The single cell according to claim 1, wherein

the thickness (tc1) of the adhering cathode layer and an average diameter (dc) of constituent particles of the air electrode satisfy a relation of $0.01dc \leqq tc1 \leqq 0.5dc$.

11. The single cell according to claim 1, wherein

the thickness (tc1) of the adhering cathode layer is within a range of $0.1\ \mu m \leqq tc1 \leqq 5\ \mu m$.

12. The single cell according to claim 1, wherein

the adhering cathode layer is formed of silver or essentially contains silver.

13. The single cell according to claim 12, wherein

the electricity collecting cathode layer essentially contains:

at least one metal selected from the group consisting of silver, platinum, gold, titanium, tungsten, lanthanum, strontium, cobalt, iron, manganese and chromium; or

at least one lanthanum complex oxide selected from the group consisting of $La_{0.3}Co_{0.7}O_3$, $La_{0.7}Sr_{0.3}CrO_3$, $La_{0.7}Sr_{0.3}FeO_3$, $La_{0.7}Sr_{0.3}MnO_3$ and $La_{0.7}Sr_{0.3}CrO_3$.

14. The single cell according to claim 1, wherein

the adhering cathode layer is formed of bismuth oxide or essentially contains bismuth oxide.

15. The single cell according to claim 14, wherein

the electricity collecting cathode layer essentially contains:

at least one metal selected from the group consisting of silver, platinum, gold, titanium, tungsten, lanthanum, strontium, cobalt, iron, manganese and chromium; or

at least one lanthanum complex oxide selected from the group consisting of $La_{0.3}Co_{0.7}O_3$, $La_{0.7}Sr_{0.3}CrO_3$, $La_{0.7}Sr_{0.3}FeO_3$, $La_{0.7}Sr_{0.3}MnO_3$ and $La_{0.7}Sr_{0.3}CrO_3$.

16. The single cell according to claim 2, wherein

the adhering anode layer contains conductive particles having a particle diameter of 0.5 μm or less; and

the electricity collecting anode layer contains conductive particles having a particle diameter of 0.8 μm or more.

17. The single cell according to claim 2, wherein

the adhering anode layer is a discontinuous thin film layer; and

the electricity collecting anode layer has conductive particles forming a three-dimensional network structure.

18. The single cell according to claim 2, wherein

a ratio (ta1/ta2) of a thickness (ta1) of the adhering anode layer to a thickness (ta2) of the electricity collecting cathode layer ranges from 1/1000 to 1/500.

19. The single cell according to claim 2, wherein

the thickness (ta1) of the adhering anode layer is equal to 1 μm or less, and

the thickness (ta2) of the electricity collecting anode layer is equal to 10 μm or more.

20. The single cell according to claim 2, wherein

the electricity collecting anode layer has pores at a rate of 30 to 70 vol% of a total volume.

21. The single cell according to claim 2, wherein

the electricity collecting anode layer is coated on the adhering anode layer approximately in a net fashion.

22. The single cell according to claim 2, wherein

the thickness (ta1) of the adhering anode layer and an average diameter (da) of constituent particles of the fuel electrode satisfy a relation of ta1 $\leqq$ da.

23. The single cell according to claim 2, wherein

the thickness (ta1) of the adhering anode layer and an average diameter (da) of constituent particles of the fuel electrode satisfy a relation of $0.01da \leqq ta1 \leqq 0.5da$.

24. The single cell according to claim 2, wherein

the thickness (ta1) of the adhering anode layer is within a range of $0.1\ \mu m \leqq ta1 \leqq 5\ \mu m$.

25. The single cell according to claim 2, wherein

the adhering anode layer contains at least one metal selected from the group consisting of nickel, nickel-chromium alloy and nickel-iron alloy, or nickel oxide.

26. The single cell according to claim 2, wherein

the electricity collecting anode layer contains at least one metal selected from the group consisting of nickel, nickel-chromium alloy and nickel-iron alloy, or nickel oxide.

27. A cell plate for a fuel cell comprising:

an plate-shaped body in which the single cells set forth in claim 1 arranged two-dimensionally to be united.

28. A cell plate for a fuel cell comprising:

an plate-shaped body in which the single cells set forth in claim 2 arranged two-dimensionally to be united.

29. A fuel cell comprising:

layered single cells, the single cell is set forth in claim 1.

30. A fuel cell comprising:

layered single cells, the single cell is set forth in claim 2.

31. A fuel cell comprising:

layered cell plates, the cell plate is set forth in claim 27.

32. A fuel cell comprising:

layered cell plates, the cell plate is set forth in claim 28.

33. A method of manufacture of a single cell comprising:

forming a solid electrolyte layer;

forming an adhering anode layer on one surface of the solid electrolyte layer and an adhering cathode layer on the other surface of the solid electrolyte layer, by use of one of a PVD method, a CVD method and a plating method;

forming an electricity collecting anode layer on the adhering anode layer and an electricity collecting cathode layer on the adhering cathode layer, by use of one of a spray coating method and a printing method; and

baking a resultant one after formation of the electricity collecting anode layer and the electricity collecting cathode layer.

34. The method according to claim 33, wherein

the baking is performed within a temperature of 700 to 1000°C.

35. The method according to claim 33, wherein

the baking is performed within a temperature, the temperature is lower by 200°C or more than a temperature lowest among sintering temperatures at which materials of the adhering anode layer, the electricity collecting anode layer, adhering cathode layer, electricity collecting cathode layer, and a solid electrolyte layer are synthesized.